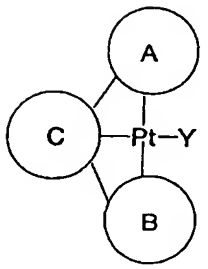
Claims

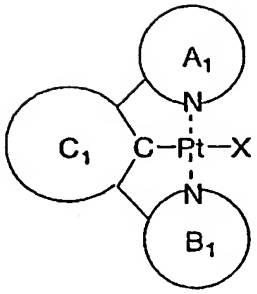
1. A platinum complex represented by the following general formula [1]:



[1]

[where in the formula, any two of a ring A, a ring B, and a ring C each independently represent a nitrogen-containing aromatic heterocyclic group coordinating to a platinum atom through a nitrogen atom, which may be substituted, and the other represents an aryl group which may be substituted, or a heteroaryl group which may be substituted, and Y represents a halogen atom, or an aryl group which may be substituted, or a heteroaryl group which may be substituted, bonded directly or through an oxygen atom (-O-) or a sulfur atom (-S-) (provided that when the adjacent two rings are nitrogen-containing aromatic heterocyclic groups, the cases where Y is a chlorine atom are excluded, and that when the nonadjacent two rings are nitrogen-containing aromatic heterocyclic groups, the cases where Y is a group other than a halogen atom are excluded)].

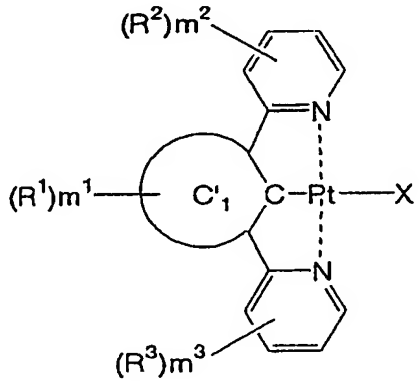
2. The platinum complex according to claim 1, represented by the following general formula [1']:



[1']

(where in the formula, a ring A_1 and a ring B_1 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, a ring C_1 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and X represents a halogen atom.)

3. The platinum complex according to claim 2, represented by the following general formula [1a']:

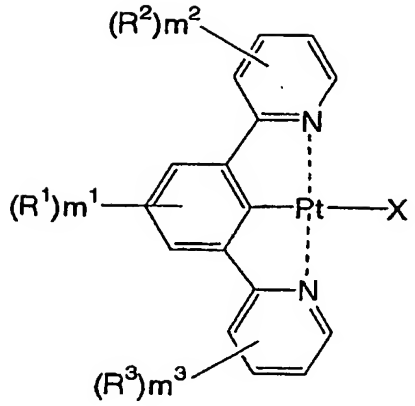


[1a']

(where in the formula, a ring C'_1 represents an aryl group or a heteroaryl group; R^1, R^2, and R^3 each independently represent a hydrogen atom, an alkyl group, a haloalkyl group, an aralkyl group, an alkenyl group, an alkynyl group, an aryl group, an amino group, a mono- or di-alkylamino group, a mono-

or di-arylamino group, an alkoxy group, an aryloxy group, a heteroaryloxy group, an alkoxycarbonyl group, an acyloxy group, an acylamino group, an alkoxycarbonylamino group, an aryloxycarbonylamino group, a sulfonylamino group, a sulfamoyl group, a carbamoyl group, an alkylthio group, an arylthio group, a heteroarylthio group, a sulfonyl group, a sulfinyl group, an ureido group, a phosphoramide group, a hydroxyl group, a mercapto group, a halogen atom, a cyano group, a sulfo group, a carboxyl group, a nitro group, a hydroxamic acid group, a sulfino group, a hydrazino group, an aliphatic heterocyclic group, an aromatic heterocyclic group, a substituted silyl group, or a polymerizable group; further, a plurality of R^1s, a plurality of R^2s, or/and a plurality of R^3s may together form a fused ring with pyridine rings or the ring C to which they are bonded; X represents a halogen atom; m^1, m^2, and m^3 represent numbers of the substituents R^1, R^2, and R^3, respectively, and m^1 represents an integer of 0 to 3, and m^2 and m^3 each represent an integer of 0 to 4; and further, when m^1, m^2, and m^3 each is an integer of 2 or more, a plurality of R^1s, a plurality of R^2s, and a plurality of R^3s may be mutually the same or different.)

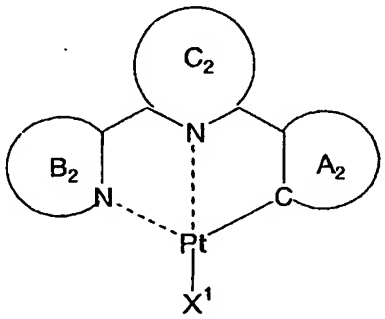
4. The platinum complex according to claim 2 or 3, represented by the following general formula [1b']:



[1b']

(where in the formula,, R^1, R^2, R^3, X, m^1, m^2, and m^3 represent the same meanings as described above.)

5. The platinum complex according to claim 1, represented by the following general formula [1'']:

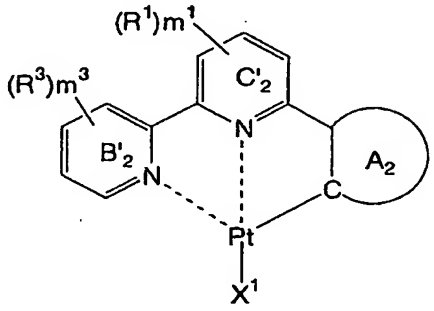


[1"]

(where in the formula, a ring B_2 and a ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, a ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted; further, the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring; and X^1 represents

a fluorine atom, a bromine atom, or an iodine atom).

6. The platinum complex according to claim 5, represented by the following general formula [1a'']:

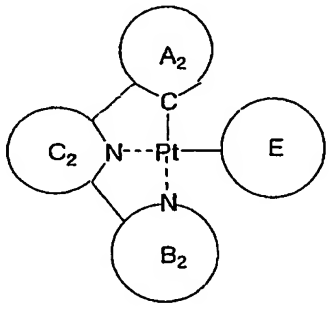


[1a"]

(where in the formula, a ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted; R^1 and R^3 each independently represent a hydrogen atom, an alkyl group, a haloalkyl group, an aralkyl group, an alkenyl group, an alkynyl group, an aryl group, an amino group, a mono- or di-alkylamino group, a mono- or di-arylamino group, an alkoxy group, an aryloxy group, a heteroaryloxy group, an alkoxycarbonyl group, an acyloxy group, an acylamino group, an alkoxycarbonylamino group, an aryloxycarbonylamino group, a sulfonylamino group, a sulfamoyl group, a carbamoyl group, an alkylthio group, an arylthio group, a heteroarylthio group, a sulfonyl group, a sulfinyl group, an ureido group, a phosphoramide group, a hydroxyl group, a mercapto group, a halogen atom, a cyano group, a sulfo group, a carboxyl group, a nitro group, a hydroxamic acid group, a sulfino group, a

hydrazino group, an aliphatic heterocyclic group, an aromatic heterocyclic group, a substituted silyl group, or a polymerizable group; further, a plurality of R^1s or/and a plurality of R^3s may together form a fused ring with pyridine rings to which they are bonded; further, the ring B'_2 and the ring C'_2, and C'_2 and the ring A_2, or the ring B'_2, the ring C'_2, and the ring A_2 may be mutually bonded to form a fused ring; m^1 and m^3 represent the numbers of the substituents R^1 and R^3, respectively, and m^1 represents an integer of 0 to 3, and m^3 represents an integer of 0 to 4; and further, when m^1 and m^3 are each an integer of 2 or more, a plurality of R^1s and a plurality of R^3s may be mutually the same or different; and X^1 is the same as described above).

7. The platinum complex according to claim 1, represented by the following general formula [1'''']:

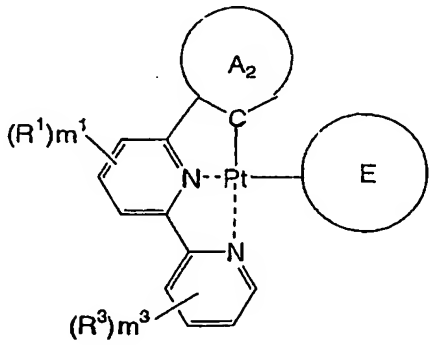


[1'''']

(where in the formula, a ring B_2 and a ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, a ring A_2 and a ring E each

independently represent an aryl group which may be substituted, or a heteroaryl group which may be substituted; the ring A_2 and the ring C_2, and the ring C_2 and the ring B_2, or the ring A_2, the ring C_2, and the ring B_2 may be mutually bonded to form a fused ring; further, in the case where the ring A_2, the ring B_2, the ring C_2, or/and the ring E each have a substituent, when the substituent is a substituent capable of coordinating or bonding to a metal, a metal atom may be coordinated or bonded through a coordinatable or bondable atom in the substituent.)

8. The platinum complex according to claim 7, represented by the following general formula [1a''']:



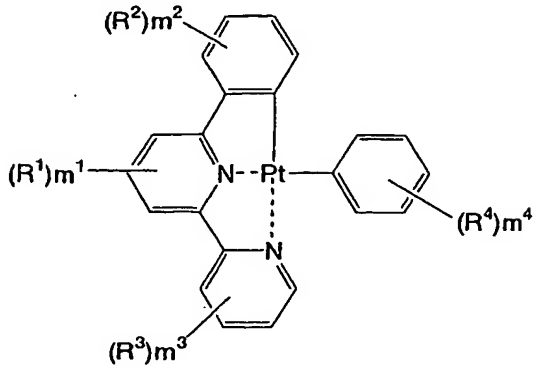
[1a'''']

(where in the formula, the ring A_2 and the ring E are the same as described above; R^1 and R^3 each independently represent an alkyl group, a haloalkyl group, an aralkyl group, an alkenyl group, an alkynyl group, an aryl group, an amino group, a mono- or di-alkylamino group, a mono- or di-arylamino group, an alkoxy group, an aryloxy group, a heteroaryloxy group, an

alkoxycarbonyl group, an aryloxycarbonyl group, an acyloxy group, an acylamino group, an alkoxycarbonylamino group, an aryloxycarbonylamino group, a sulfonylamino group, a sulfamoyl group, a carbamoyl group, an alkylthio group, an arylthio group, a heteroarylthio group, a sulfonyl group, a sulfinyl group, an ureido group, a phosphoramide group, a hydroxyl group, a mercapto group, a halogen atom, a cyano group, a sulfo group, a carboxyl group, a nitro group, a hydroxamic acid group, a sulfino group, a hydrazino group, an aliphatic heterocyclic group, an aromatic heterocyclic group, a substituted silyl group, or a polymerizable group; further, R^1 and R^3 may together form a fused ring with two pyridine rings to which they are bonded; R^1 and the ring A_2, or R^1, R^3, and the ring A_2 may together form a fused ring; m^1 and m^3 represent the numbers of the substituents R^1 and R^3, respectively, m^1 represents an integer of 0 to 3, and m^3 represents an integer of 0 to 4; and further, when m^1 and m^3 are each an integer of 2 or more, a plurality of R^1s and a plurality of R^3s may be mutually the same or different; further, a plurality of R^1s or/and a plurality of R^3s may together form a fused ring with the pyridine rings to which they are bonded; and further when R^1, R^3, and each substituent in the ring A_2 or/and the ring E are each a substituent capable of coordinating to a metal or capable of bonding to a metal, a metal atom may be coordinated or bonded through a coordinatable or bondable atom in the

substituent.)

9. The platinum complex according to claim 7 or 8, represented by the following general formula [1b'''']:



[1b''']

(where in the formula, R^1, R^2, R^3, and R^4 each independently represent an alkyl group, a haloalkyl group, an aralkyl group, an alkenyl group, an alkynyl group, an aryl group, an amino group, a mono- or di-alkylamino group, a mono- or di-arylamino group, an alkoxy group, an aryloxy group, a heteroaryloxy group, an alkoxycarbonyl group, an aryloxycarbonyl group, an acyloxy group, an acylamino group, an alkoxycarbonylamino group, an aryloxycarbonylamino group, a sulfonylamino group, a sulfamoyl group, a carbamoyl group, an alkylthio group, an arylthio group, a heteroarylthio group, a sulfonyl group, a sulfinyl group, an ureido group, a phosphoramide group, a hydroxyl group, a mercapto group, a halogen atom, a cyano group, a sulfo group, a carboxyl group, a nitro group, a hydroxamic acid group, a sulfino group, a hydrazino group, an aliphatic heterocyclic group, an aromatic heterocyclic group, a

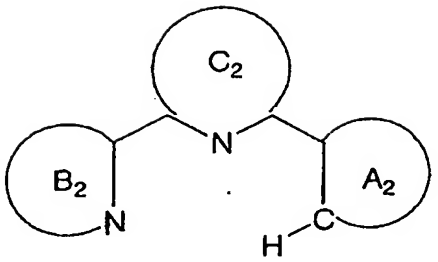
substituted silyl group, or a polymerizable group; further, R^1 and R^2, R^1 and R^3, or/and R^1, R^2, and R^3 may together form a fused ring with the two pyridine rings, or the pyridine ring and the benzene ring to which they are bonded; m^1, m^2, m^3, and m^4 represent the numbers of the substituents R^1, R^2, R^3, and R^4, respectively, m^1 represents an integer of 0 to 3, m^2 and m^3 each represent an integer of 0 to 4, and m^4 represents an integer of 0 to 5; and further, when m^1, m^2, m^3, and m^4 are each an integer of 2 or more, a plurality of R^1s, a plurality of R^2s, a plurality of R^3s, and a plurality of R^4 may be mutually the same or different; further, R^1s, R^2s, R^3s, or/and R^4s may together form a fused ring with the pyridine rings or the benzene rings to which they are bonded; and further when R^1, R^2, R^3, and/or R^4 are each a substituent capable of coordinating to a metal or capable of bonding to a metal, a metal atom may be coordinated or bonded through a coordinatable or bondable atom in the substituent.)

10. A method for producing the platinum complex according to claim 5, characterized by allowing a platinum diene complex represented by the general formula [2]:

$$Pt(X^1)_2(D) \qquad [2]$$

(where in the formula, D represents a nonconjugated diene compound, and X^1 represents a fluorine atom, a bromine atom, or an iodine atom) and a compound represented by the general

formula [3]:



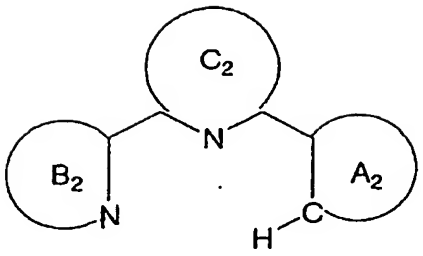
[3]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring) to react with each other.

11. A method for producing the platinum complex according to claim 5, characterized by allowing a platinum diene complex represented by the general formula [2a]:

$$Pt(Cl)_2(D) \qquad [2a]$$

(where in the formula, D represents a nonconjugated diene compound), a compound represented by the general formula [3]:



[3]

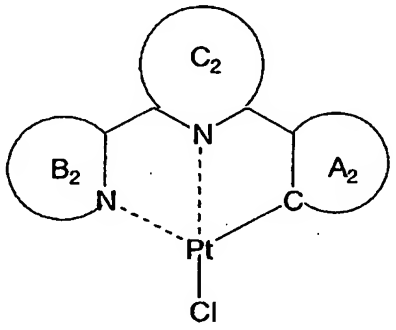
(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring), and a halogenating agent for substituting a halogen atom other than chlorine to mutually react.

12. The production method according to claim 11, wherein the platinum diene complex represented by the general formula [2a] is first allowed to react with the compound represented by the general formula [3], and then, allowed to react with the halogenating agent for substituting a halogen atom other than chlorine.

13. The production method according to claim 12, wherein the reaction of the platinum diene complex represented by the

general formula [2a] and the compound represented by the general formula [3], and the subsequent reaction with the halogenating agent are carried out in one pot.

14. A method for producing the platinum complex according to claim 5, characterized by allowing a platinum complex represented by the general formula [1b'']:



[1b"]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring), and a halogenating agent for substituting a halogen atom other than chlorine to react with each other.

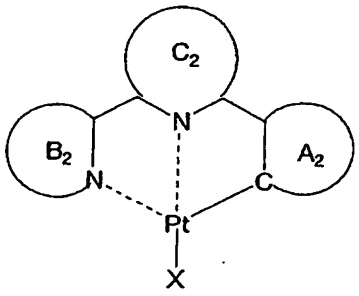
15. A method for producing a platinum complex having a tridentate ligand, and having a halogen atom, characterized

by using a platinum diene complex represented by the general formula [2b]:

$Pt(X)_2(D)$ [2b]

(where in the formula, D represents a nonconjugated diene compound, and X represents a halogen atom) as a platinum source.

16. The production method according to claim 15, wherein the platinum complex having a tridentate ligand, and having a halogen atom is a platinum complex represented by the following general formula [1c'']:

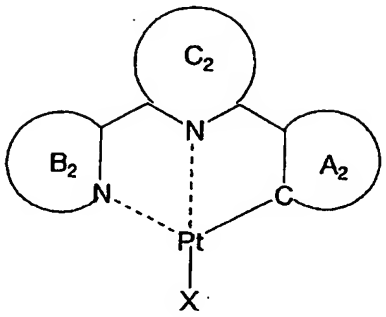


[1c"]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring; and X represents a halogen atom).

17. A method for producing a platinum complex represented by

the general formula [1c'']:

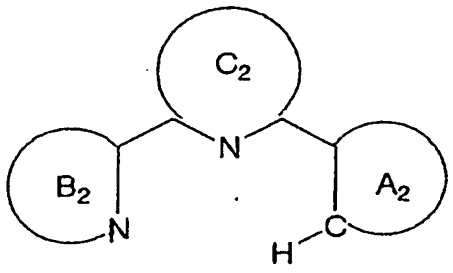


[1c"]

(where in the formula, the ring B_2, the ring C_2, the ring A_2, and X are the same as described above.), characterized by allowing a platinum diene complex represented by the general formula [2b]:

$$Pt(X)_2(D) \qquad [2b]$$

(where in the formula, D represents a nonconjugated diene compound, and X represents a halogen atom.) and a compound represented by the general formula [3]:

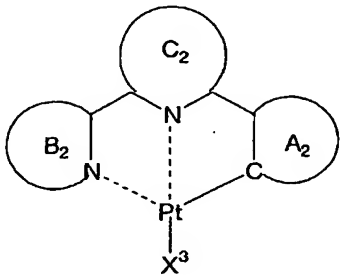


[3]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and

the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring) to react with each other.

18. A method for producing a platinum complex represented by the general formula [1d'']:

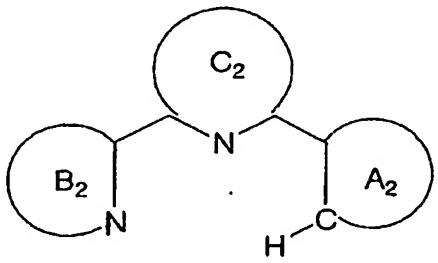


[1d"]

(where in the formula, the ring B_2, the ring C_2, and the ring A_2 are the same as described above; and X^3 represents a halogen atom (provided that the cases where X and X^3 are the same are excluded)), characterized by allowing a platinum diene complex represented by the general formula [2b]:

$$Pt(X)_2(D) \qquad [2b]$$

(where in the formula, D represents a nonconjugated diene compound, and X represents a halogen atom), a compound represented by the general formula [3]:



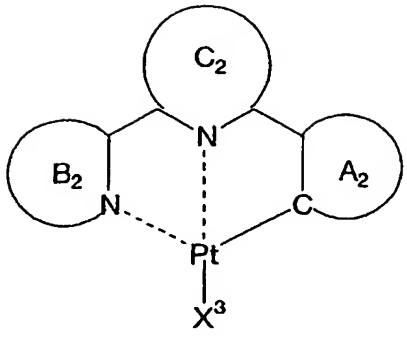
[3]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring), and a halogenating agent for substituting a halogen atom other than X to mutually react.

19. The production method according to claim 18, wherein the platinum diene complex represented by the general formula [2b] is first allowed to react with the compound represented by the general formula [3], and then, allowed to react with the halogenating agent for substituting a halogen atom other than X.

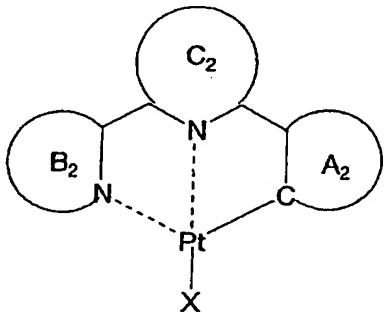
20. The production method according to claim 19, wherein the reaction of the platinum diene complex represented by the general formula [2b] and the compound represented by the general formula [3], and the subsequent reaction with the halogenating agent are carried out in one pot.

21. A method for producing a platinum complex represented by the general formula [1d'']:



[1d"]

(where in the formula, the ring B_2, the ring C_2, and the ring A_2 are the same as described above; and X^3 represents a halogen atom (provided that the cases where X and X^3 are the same are excluded)), characterized by allowing a platinum complex represented by the general formula [1c'']:



[1c"]

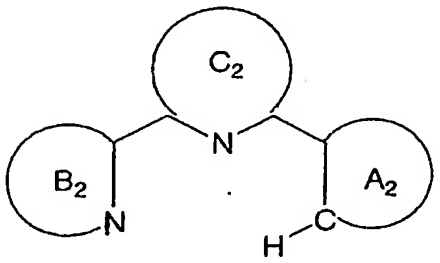
(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring; and X represents a halogen atom), and a halogenating agent

for substituting a halogen atom other than X to react with each other.

22. A method for producing the platinum complex according to claim 7, characterized by allowing a platinum diene complex represented by the general formula [2b]:

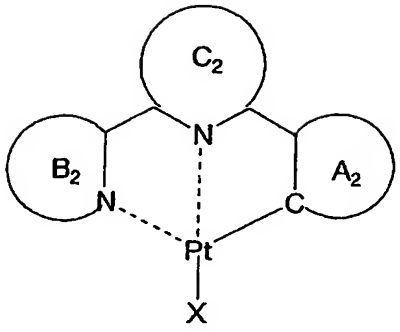
$$Pt(X)_2(D) \qquad [2b]$$

(where in the formula, D represents a nonconjugated diene compound, and X represents a halogen atom) and a compound represented by the general formula [3]:



[3]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring) to react with each other, and thereby forming a platinum complex represented by the general formula [1c'']:



[1c"]

(where in the formula, the ring B_2, the ring C_2, the ring A_2, and X are the same as described above), and then, allowing a Grignard reagent represented by the general formula [4]:

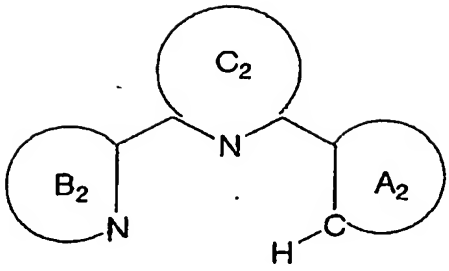
$$EMgX^2 \qquad [4]$$

(where in the formula, E represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and X^2 represents a halogen atom) to act thereon.

23. A method for producing the platinum complex according to claim 7, characterized by allowing a platinum compound represented by the general formula [5]:

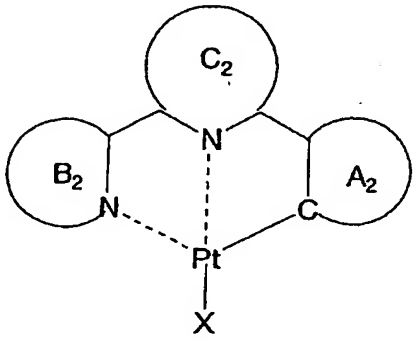
$$M_2PtX_4 \qquad [5]$$

(where in the formula, M represents an alkali metal atom, and X represents a halogen atom.)) and a compound represented by the general formula [3]:



[3]

(where in the formula, the ring B_2, the ring C_2, and the ring A_2 are the same as described above) to react with each other, and thereby forming a platinum complex represented by the general formula [1c'']:



[1c"]

(where in the formula, the ring B_2, the ring C_2, the ring A_2, and X are the same as described above), and then, allowing a Grignard reagent represented by the general formula [4]:

$$EMgX^2 \qquad [4]$$

(where in the formula, E represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and X^2 represents a halogen atom) to act thereon.

24. A method for producing the platinum complex according to

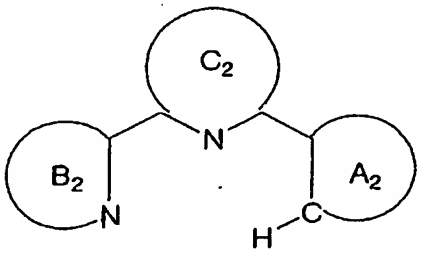
claim 7, characterized by, on a platinum diene complex represented by the general formula [2b]:

$$Pt(X)_2(D) \qquad [2b]$$

(where in the formula, D represents a nonconjugated diene compound, and X represents a halogen atom), allowing a Grignard reagent represented by the general formula [4]:

$$EMgX^2 \qquad [4]$$

(where in the formula, E represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and X^2 represents a halogen atom) to act, and then, allowing a compound represented by the general formula [3]:



[3]

(where in the formula, the ring B_2 and the ring C_2 each independently represent a nitrogen-containing aromatic heterocyclic group which may be substituted, the ring A_2 represents an aryl group which may be substituted or a heteroaryl group which may be substituted, and the ring B_2 and the ring C_2, the ring C_2 and the ring A_2, or the ring B_2, the ring C_2, and the ring A_2 may be mutually bonded to form a fused ring) to react therewith.